Concerns about the presence of faults, fractures, breccia pipes, historical exploration boreholes or any other breaches in confining zones.

8157	Anonymous	Individual	The in-situ mining process used in uranium mining leaves the solid waste in the aquifer but leaves in its aftermath an oxidizing environment that permits the flow of radioactive and toxic metals to continue down gradient within that aquifer until it finds a fracture, unfilled bore hole or breccia conduit to aquifers both above and below the mined aquifer. This is called an excursion. Furthermore, a class V (deep disposal well) has to be created to dispose of the bleed water too contaminated to return to the mined aquifer that given time could be involved in an excursion that will reach drinking water aquifers as well. All of this is out of sight and out of mind to the casual observer. After the yellowcake from the mine is processed into uranium 235 and enormous amount of U238 remains to be disposed of in very threatening ways. Tritium is leaked into the water while the reactor is using up its fuel. After the U235 reaches a point where it has to be disposed of the fission products that that have the potential of being biollogically active; such as Cs131, I137, Sr90, et.al,, must be stored in casks that are subject to cracking because of the extreme heat and neutron activation. These casks have no place to go and if they were transported could be very dangerous.
8187	Ex. 6 Personal Privacy (PP)	Individual	The proposed mine and deep disposal wells are in an area that is documented to have faults, fractures, breccia pipes, and over 7000 old boreholes that have not been properly plugged. It will be impossible to contain mining fluids or waste liquids, and contamination of groundwater is very likely.
8196.1		Oglala Sioux Tribe	[...] **ISSUE OF CONFINEMENT IN THE CLASS III WELL AREAS** Perhaps the most important technical problem with the EPA documents has to do with the confinement of mining fluids in the Class III UIC well areas. This goes to the heart of the safety of the project, and to the heart of the future of the region. Real doubts exist whether the mining fluids can be contained at the proposed mine site. As Dr. Hannan LaGarry's direct observation of Permittee's records shows there are around 7,500 old boreholes on the site, not the lower numbers put forward by the EPA or the Permittee . It is highly unlikely that all old boreholes can be found and properly plugged. In addition, research by Boggs and Jenkins ("Analysis of Aquifer Tests Conducted at the Proposed Burdock Uranium Mine Site: Burdock, South Dakota," 1980) indicated leakage across the Fuson shale between the Lakota and Fall River formations in the Burdock area; this is one of the TVA papers. The Class III Fact Sheet notes the connection between the Chilson and Fall River formations in the Dewey area, which was from the other TVA test done in the early 1980s. This found the Chilson member of the Lakota formation to be "exceptionally permeable," as quoted by Dr. Perry Rahn (2014. "Permeability of the Inyan Kara Group in the Black Hills Area and its relevance to a proposed in-situ leach uranium mine" in the Proceedings of the South Dakota Academy of Science). Dr. Rahn is Professor Emeritus at the South

			Dakota School of Mines and the acknowledged expert in matters related to hydrology in the southern Black Hills. The EPA also notes that Permittee's pump test in the Dewey area was not only done differently, but the TVA test was done at a pumping rate of 16 times higher than the Permittee's tests. This would be the way such tests would be conducted if the purpose was to show that no connections exist between formations in the Dewey area. Therefore, a more comparable update of the Dewey study is needed. One critical issue in the revised draft Class III UIC permit is the assumption that the Fuson Shale of the Lakota Formation serves as the confining zone between the Fall River Formation injection interval and the underlying Chilson Sandstone of the Lakota Formation. On p. 23 of the Class ill Fact Sheet, it states that: "There may be points where the Fuson confining zone has been compromised by improperly plugged exploration drill holes or wells that penetrate the Fuson confining zone. Evidence that suggests at least one breach in the Fusion confining zone is included in the reports on the pump tests conducted by the Tennessee Valley Authority (TVA) and the Permittee in the Chilson aquifer in the Burdock area." The draft permit then goes on to specify that the Permittee will conduct wellfield delineation drilling during the initial stages of the pump testing phase to "provide more detailed information about the thickness and continuity of the Fusion confining zone" However, since breaches are already known to exist, the EPA should require corrective action be done BEFORE issuing the Class III area permit, not AFTER. The revised draft Class ill UIC permit also continues to rely heavily on belief that the Morrison Formation is an adequate lower confining layer. However, it should seriously be re-considered because "The Morrison Formation is intersected by 26 exploration drillholes throughout the Dewey-Burdock Project Area." (Found on p. 23 of the Class III Fact Sheet). Again, just like the Fusion case as noted above, the EPA should require the Permittee to verify that breaches do not exist before issuing the permit. We also do not agree with EPA's.concurrence with the Permittee's assertion that the Unkpapa USDW underlying the Morrison Formation does not need to be monitored during the injection activities. In addition, the graphics supplied in the documents showing the Morrison Formation are not to scale and appear quite thick (e.g. Fig6, p. 25), so it seems to be a purposeful way to mislead the public. Research by Wicks, Dean, and Kulander ["Regional tectonics and fracture patterns in the Fall River Formation (Lower Cretaceous) around the Black Hills foreland uplift, western South Dakota and northeastern Wyoming." 2000] indicated that the Fall River formation is "pervasively fractured" along the western edge of the Black Hills. The opinions of Dr. Robert Moran and Dr. Hannan LaGarry, which were previously submitted to NRC, also indicate that fractures, faults, breccia pipes, and other geological characteristics of the project area, have not been adequately researched. The Second Draft Class III Fact Sheet (p. 32) says that there are 64 drinking water, irrigation, and livestock wells in or within 1.2 miles of the mine boundary. To families on the ground, the situation is a high-stakes of their long-term health. It is critical that the geology of the area be fully understood-preferably before the draft permits were issued - but certainly before any further steps are taken.

			Research by Tank (1958. "Clay Mineralogy of Morrison Formation, Black Hills area, Wyoming and South Dakota," Bulletin of the American Association of Petroleum Geologists"), which may be the only focused research on the Morrison formation in the Dewey-Burdock area, indicates that the formation' s thickness varies widely and that there is a "marked difference" between the formation's composition in Edgemont and seven miles north of Edgemont. Given the other information that is available and the importance of this particular issue it is irresponsible for the EPA to conclude that mining fluids will be contained since this conclusion seems to be based mainly on the Permittee's documents, limited scientific information, and weak analysis. The EPA should obtain accurate and substantial third-party and peer-reviewed information and must analyze it thoroughly before granting these UIC permits and aquifer exemptions. It says on the Page 123 of the Class III Fact Sheet:" The previous Class III draft Area Permit required the Permittee to conduct post-restoration monitoring to demonstrate that no ISR contaminants would cross the aquifer exemption boundary. This updated Class III draft Area Permit now requires the Permittee to develop a reactive transport geochemical model to evaluate the potential for ISR contaminant to cross the downgradient aquifer exemption boundary. To improve the predictive capabilities of the geochemical model, the Class III draft Area Permit requires the Permittee to first develop a Conceptual Site Model (CSM) and conduct targeted monitoring to calibrate the model as discussed later in this section." Unfortunately, when comparing EPA documents from 2017 to 2019, this is a major step in the wrong direction. EPA's proposal to eliminate down-gradient compliance boundary wells and post-restoration monitoring, and to replace them with a conceptual model is plainly wrong. Replacing physical monitoring with model-based extrapolation is a bad idea because models are not able to accurately depict the real world, especially in a complex hydrogeological environment like this area of the Black Hills. Both down-gradient compliance boundary wells and post-restoration monitoring should be kept as requirements of this project.
8291	Ex. 6 Personal Privacy (PP)	Defenders of the Black Hills	[...] In addition, the amount of "general leakage" was also studied by the Tennessee Valley Authority in 1980 and showed that leakage from one aquifer to another occurs not just from the normal cracks in shale, but also from Breccia pipes, especially common in sandstone, and from the thousands of initial exploratory boreholes that were drilled with the initial explorations for Uranium deposits in the Edgemont, SD, area. Not only will leakage occur from the natual leakage from shale but also from these physical conduits both manmade and natural. [...]

Comments about the cost or technical feasibility of treating/remediation of contaminated groundwater

Letter ID	Commenter Name	Commenter Org.	Text
8232	Ex. 6 Personal Privacy (PP)	Rebecca Terk	As we have seen in the northwestern corner of the state with the Riley Pass reclamation efforts, clean-up of old abandoned uranium mining sites is a lengthy and expensive project involving enormous taxpayer funding. We cannot risk yet another massive taxpayer-funded reclamation project created by permitting a completely inexperienced company to mine hazardous materials in this state. Clean up of contaminated soils is one thingclean up of a contaminated aquifer is simply not possible with current technology. The in-situ process used in uranium mining leaves in its aftermath an oxidizing environment that permits the flow of radioactive and toxic metals to continue down gradient within that aquifer until it finds a fracture, unfilled bore hole or breccia conduit to aquifers both above and below the mined aquifer. This is called an excursion. Furthermore, a class V (deep disposal well) has to be created to dispose of the bleed water too contaminated to return to the mined aquifer that, given time, could be involved in an excursion that will reach drinking water aquifers as well.